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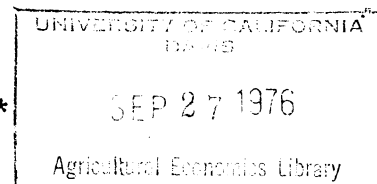
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THE CHANGING STRUCTURE OF
U.S. TRADE: IMPLICATIONS FOR AGRICULTURE*



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The Changing Structure of
U.S. Trade: Implications for Agriculture

The structure of U.S. trade has undergone major changes in the post-World War II period. In this article we attempt to (1) document the major elements of that change, (2) suggest some hypotheses that may explain the change, and (3) draw some of the implications for economic policy. Of special interest in this latter regard is the apparent decline in productivity growth in U.S. agriculture and the declining support for agricultural research.

The Changing Structure of Our Trade

There has been a growing economic interdependence among countries in the post-World War II period. Trade has expanded more rapidly than world gross output, with the result that individual countries have tended to become increasingly dependent on foreign trade both for markets and as a source of supply for important raw materials and other goods and services.

Although less dependent on foreign trade than many countries, the U.S. has not been immune to the general trend. The data in Table 1 provide a broad overview of changes that have been taking place. The overall export coefficient increased by 25 percent between the periods 1950-53 and 1970-74, while the overall import coefficient increased by 74 percent.^{1/} The commodity boom of 1973 and 1974, as well as the rise in oil prices due to the OPEC oil cartel, influenced the data in the latter period. But clearly the basic trends were already in evidence in 1971 and 1972.

U.S. agriculture in particular has become increasingly integrated with the world economy. In the first place, foreign markets have become increasingly important to our agricultural sector. As the data in Table 1 indicate, the export coefficient for agriculture doubled between the 1950-53 and 1970-74 periods. Although once again influenced by the data for 1974, when we sustained exports in the face of a large production shortfall at home, the export coefficient for agriculture had still increased by 80 percent if that unusual year is ignored.

^{1/} Export and import coefficients are convenient ways of referring to the fraction of output that is exported and the fraction of domestic consumption that is imported, respectively.

Table 1. Import and Export Coefficients by Sectors and for the Economy on a Whole. (Values in Percentage of Sector Income)

	Export Coef- ficients for Agriculture	Export Coef- ficients for Non-Agriculture	Export Coef- ficients Total	Import Coef- ficients for Agriculture	Import Coef- ficients for Non-Agriculture	Import Coef- ficients Total
50-53	18.68	4.08	5.00	25.29	2.27	3.69
55-57	26.39	4.29	5.24	26.38	2.48	3.51
58-61	26.93	3.80	4.72	23.62	2.72	3.57
62-65	32.67	3.82	4.83	22.60	2.93	3.61
66-69	30.05	4.02	4.83	22.37	3.83	4.40
70-74	38.38	5.13	6.28	22.01	5.87	6.43
71	32.05	4.29	5.07	24.26	4.76	5.31
72	32.64	4.30	5.16	22.45	5.32	5.84
73	35.10	5.16	6.59	17.57	5.95	6.47
74	51.75	6.83	8.50	24.11	8.17	8.76
70-73	33.73	4.60	5.59	21.25	5.16	5.71

Source: Economic Research Service and U.S. Bureau of Census

Interestingly enough, the export coefficient for the non-agricultural sector increased by only 25 percent in the same period, and on a much smaller basis. Similarly, the import coefficient for agricultural products declined by almost 13 percent between the two base periods, while the import coefficient for the non-agricultural sector more than doubled, even ignoring the oil-based increases of 1973 and 1974.

The second sense in which U.S. agriculture has become increasingly integrated with the world economy is through the tendency over time for other countries to become more dependent on the U.S. as a source of supply for grains. Given our present vantage point, it is easy to forget that as recently as the mid-1930's, the United States was of minimal importance in the world grain trade (Table 2). Latin America was by far the largest net exporter at that time, followed by Canada, the USSR and Eastern Europe, and Australia.

By the early 1970's, Latin America had become a net importer in many years, and other regions such as the USSR and Eastern Europe, North Africa and the Middle East, and Asia had all become large net importers. The United States, on the other hand, had become by far the dominant source of grain exports, supplying roughly 40 percent of the total.

A third, and perhaps the most important respect in which U.S. agriculture has become more strongly linked to the world economy, is through our trade balance. Although little recognized in contemporary discussion of trade and trade problems, there has been a major shift in the structure of U.S. trade, with the result that agriculture now makes a major contribution to our trade balance. Throughout the 1930's, the early 1940's, and the decade of the 1950's, the United States imported more agricultural products (in the form of coffee, cocoa, and other tropical products) than it exported. It was only in the 1960's that the trade balance for agricultural products was positive. And even in the first three years of the decade, commercial exports relative to total agricultural imports still ran a deficit on the trade account.

Table 2. World net imports and exports of grain, selected periods, 1934-73

(Millions of metric tons; annual averages)

Country	Net imports (-) or net exports				
	1934-38	1948-52	1960-62 ^{1/}	1969-71 ^{1/}	1972-73 ^{1/}
Developed countries:					
United States	0.5	14.0	32.8	39.8	73.6
Canada	4.8	6.6	9.7	14.8	14.8
South Africa	.3	.0	2.1	2.5	3.1
Oceania	2.8	3.7	6.6	10.6	8.9
Western Europe	-23.8	-22.5	-25.6	-21.4	-21.0
Japan	-1.9	-2.3	-5.3	-14.4	-18.5
Centrally planned countries:					
U.S.S.R. and Eastern Europe	4.7	2.7	.5	-3.6	-14.2
China	-1.0	-.4	-3.6	-3.1	-6.3
Developing countries:					
Latin America	9.0	2.1	.8	3.2	.6
North Africa and Middle East	1.0	-.1	-4.6	-9.2	-13.7
Asia	2.4	-3.3	-5.6	-11.0	-14.8

^{1/} Fiscal years.

Note. - Grain includes wheat, milled rice, corn, rye, barley, oats, sorghum, and millet.

Source: Department of Agriculture, Economic Research Service.

Table 3 documents the major change that has taken place in the structure of our trade. In calendar year 1971 we ran the first deficit on our current accounts in modern history - except for a tiny deficit in 1936. Associated with this deficit was a large deficit in the trade account on non-agricultural products - a deficit that began to emerge in 1968, and for the first time since 1930.

The deficit in our trade balance of non-agricultural products literally burgeoned in the period 1971 through 1974. But at the same time that this deficit burgeoned, the surplus on the agricultural trade account also burgeoned. In 1973 that surplus was more than sufficient to offset an \$8 billion deficit in our trade in non-agricultural products. In 1974, it was just \$3 billion short of offsetting an almost \$15 billion deficit in the trade in non-agricultural products. And in 1975, of course, the \$12.5 billion surplus in our agricultural trade accounts contributed mightily to the record \$10.2 billion surplus in our total trade accounts.

1975 was an unusual year, however, due to the serious economic retraction both here and in other advanced countries. Our imports of non-agricultural products declined by \$3.2 billion, despite the continued high price of oil, while our exports of non-agricultural exports increased by almost \$10 billion. Non-agricultural exports were sustained primarily by a \$7.8 billion increase in manufactured exports which was composed primarily of increased machinery sales. These in turn were due to stepped-up spending of oil revenues by the OPEC countries on their construction and development projects, and the lag in shipments of some types of machinery against orders placed when foreign demand was stronger.

The important point, however, is that despite the recession in the U.S. economy, which brought with it the first decline in our imports since 1961, the trade balance in non-agricultural products still ran a deficit in 1975 of \$2 billion. Agriculture, on the other hand, ran a surplus of over \$12 billion, despite a rather sizable decline in commodity prices during the year. The change in structure of our trade appeared to prevail despite the unusual conditions of 1975.

Table 3. U.S. Exports, Imports, and Trade Balance: Total, Nonagricultural, and Agricultural, Calendar Year Basis, Selected Years
(million dollars)

Year	Exports			Imports			Trade Balance		
	Total	Nonagric.	Agric.	Total	Nonagric.	Agric.	Total	Nonagric.	Agric.
1950-52 aver.	13,357	9,909	3,448	10,102	5,545	4,557	3,254	4,363	-1,109
1960-62 aver.	20,853	15,890	4,963	15,308	11,513	3,794	5,546	4,377	1,169
1970	42,590	35,331	7,259	39,756	33,986	5,770	2,834	1,345	1,489
1971	43,492	35,799	7,693	45,516	39,693	5,823	-2,024	-3,894	1,870
1972	48,876	39,475	9,401	55,282	48,815	6,467	-6,406	-9,340	2,934
1973	70,246	52,566	17,680	69,024	60,615	8,419	1,222	-8,039	9,261
1974	97,908	75,904	21,999	100,997	90,750	10,247	-3,084	-14,871	11,752
1975	107,247	85,353	21,894	96,952	87,624	9,328	10,295	-2,271	12,566*

* From Patus, February 1976, p. 6

Source: Economic Research Service and Council on International Economic Policy.

This change in the structure of U.S. trade is of major significance to the U.S. economy. It puts a major constraint on our policy, and should serve as a warning to those who want to intervene with our agricultural exports. But equally as important, it is a development that we need to understand a great deal better, both in terms of the recent shift and in terms of the longer-term secular change. In the next section we suggest some possible explanations for the observed shifts. If these possible explanations prove to be valid, they contain important implications for future policy.

Possible Explanations

The shift in our structure of trade is undoubtedly due to a complex of factors associated with development policies and the character of development both here and abroad, with trade policies of the U.S. and other countries, and the transferability of production technology. To take our bearings, it is useful to note where the increased agricultural exports have been going. Data in the top part of Table 4 indicate that the largest percentage increases have been to the Socialist countries, Africa, Asia, and Japan, in that order. The smallest increases were to Western Europe and Canada, followed by Latin America. The increases to the Socialist countries and to Africa were on a small base, however, as indicated in the bottom of the table. The expanding share to Asia and Japan were on a larger base, and therefore were of more importance. At the other end of the spectrum are Latin America, Western Europe, and Canada, whose share of our exports have actually declined over time.

One of the obvious tentative hypotheses for our apparent growing comparative advantage in agricultural exports is our past willingness to invest in agricultural research. Boyce and Evenson's recent collation of data on research and extension expenditures shows that in 1959 North America (Canada and the U.S.) ranked

fourth among 18 regions of the world when expenditures on research were expressed as a percent of the value of agricultural output. By 1974, we were still an important investor in agricultural research, but our rank had declined to eighth place among the 18.

Table 4. Indices and Share of U.S. Exports by Country or Region of Destination, 1950-51 to 1975.

Indices of Value of U.S. Exports by Country or Region of Destination:

Year	Japan	Canada	West. Europe	Asia	Soc. Countries	Africa	Latin America
50-51	100	100	100	100	100	100	100
60-62	134	174	119	252	635	495	95
70-72	325	294	168	370	1,524	496	169
75	778	376	318	678	8,870	1,020	368
74	903	465	404	965	6,453	1,993	558

Share of U.S. Exports by Country or Region of Destination: (Percent)

Year	Japan	Canada	West. Europe	Asia	Soc. Countries	Africa	Latin America
50-51	11.1	7.9	53.0	12.3	0.6	1.7	13.4
60-62	10.1	9.3	42.8	20.9	2.8	5.5	8.6
70-72	15.4	10.0	38.0	19.4	4.2	3.5	9.5
75	17.6	6.0	34.4	17.0	11.7	3.4	9.9
74	16.2	6.0	34.6	19.2	6.7	5.3	12.0

Source: U.S. Bureau of Census, Statistical Abstract of the United States, Washington, D.C. (Several issues).

Science and technology policy is not the only issue, however. There are important interactions between economic policy and technology policy. For example, the dollar standard which governed trade among countries in the post-World War II period (through 1971) caused the U.S. dollar to be over-valued relative to other major trading currencies. As a result, the U.S. exported dollars, part of which were used to buy up and/or to establish manufacturing industries around the world. Associated with the transfer of capital was a transfer of the technological and managerial knowhow of U.S. industry. The

over-valued dollar also made foreign produced products more competitive with domestic products, so American industry located abroad began to export back to the U.S.

important

A number of differences between manufacturing and agriculture are worth noting in this context. First, technology is more transferable in the industrial sector than it is in the agricultural sector. It is now well recognized that most agricultural research is highly location specific, and that new production technology has to be adapted to the ecological and economic conditions of the particular country. The same does not apply to industrial technology, or it applies to a much lesser extent.

Second, governments in the developing countries were for the most part discriminating against their agricultural sectors. Little, Scitovsky and Scott, for example, argue that in the ^{low-income} countries they studied, industrial protection policy associated with import-substituting industrialization redistributed income from agriculture to industry during the period 1947-55 that was equivalent to a tax on farmers of between 30 and 40 percent. This implicit tax, which was typically imposed through trade policy, held agriculture back in the developing countries.

In addition, it increased the incentives for U.S. capital outflows to be invested in the industrial sector in other countries, and not in agriculture. Both the protective measures to industry and the disincentives to agriculture explain in part why markets for our industrial products have not grown more rapidly abroad, while markets for our agricultural products have.

The rapid rates of population growth in the low-income countries have also undoubtedly added to their demand for U.S. agricultural exports. Population growth is a strong shifter of the demand for agricultural output. The combination of rapid population growth, discriminatory economic policies against

their agricultural sectors, and the failure to invest in agricultural production technology caused many developing countries to become increasingly dependent on agricultural imports to feed their growing population.

A final factor which undoubtedly had an influence on our comparative advantage was the interaction of economic and technology policy^{here} at home. Past investments in agricultural research gave U.S. agriculture a superb production capability. The new technology that was produced was probably adopted at a faster rate than would have otherwise been the case because of the downward pressure on product prices that resulted from a combination of the over-valued dollar and the output growth associated with the new production technology. Hence, the combination of trade and technology policy forced the rapid modernization of our agricultural sector.

When the dollar was eventually devalued, the inherent comparative advantage of U.S. agriculture came to the fore, and at a time when agriculture in other countries was experiencing difficulties. This explains in part why our net trade position in agricultural products has grown so rapidly in recent years.

Where Do We Go From Here?

The freeing up of exchange rates around the world has enabled the U.S. in recent years to capitalize in a major way on the comparative advantage it has in agricultural products - a comparative advantage that is due in no small part to superior technological capability. This comparative advantage, together with more flexible exchange rates, has stood us in good stead in the face of the OPEC - induced increase in oil prices and our own growing energy demands. A key question is whether we will continue to be able to count on this advantage in the future.

A number of factors give rise to cause for concern. In the first place, the rate of productivity growth in U.S. agriculture has declined markedly. Total factor productivity in the sector increased 27 percent in the 1950's, but in the

1960's it increased only 11 percent according to the Council of Economic Advisers. Moreover, a recent study by the National Academy of Science raises serious questions about continued technical progress in U.S. agriculture unless some fairly basic technological breakthroughs are forthcoming.

To further complicate the problem, the U.S. is not sustaining its investments in agricultural research, if correction is made for inflation. As noted earlier, its rank in terms of percent of agricultural output spent on agricultural research has declined from fourth in 1959 to eighth in 1974. More importantly, expenditures in other regions of the world are growing rapidly, whereas ours are leveling off and declining when changes in the price level are taken account of.

The U.S. has become increasingly dependent on agricultural exports to finance a rapidly growing import bill. Whether it will be able to depend on those exports in the future will depend very much on whether productivity growth in agriculture can be sustained. Whether this occurs, of course, will depend in turn on whether the trend in investment in agricultural research can be turned back up, and whether agricultural scientists can make new breakthroughs which will give us the potential for productivity growth.

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$$P_x \left(\frac{dx}{dx - s_x} + \frac{dx \cdot s_x}{dx - s_x} \right)$$

$$\left(P_x \frac{dx}{dx - s_x} \right) + \frac{P_x \cdot dx \cdot s_x}{dx - s_x}$$

$$+ \frac{P_x M_0 \cdot s_m}{s_m - d_m} + \frac{P_x M_0 \cdot s_m \cdot dx}{s_m - d_m}$$

$P_x M_0$

